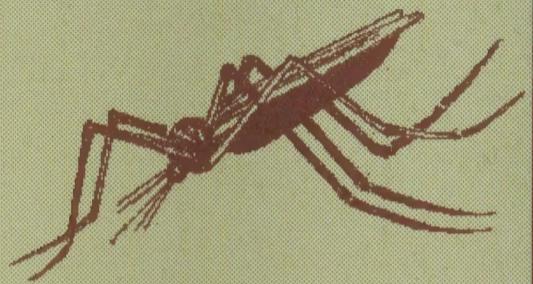


# A to Z of Malaria

*... and more*



**the ant**

the action northeast trust

07046

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# *A to Z of Malaria ... and more*



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the action northeast trust

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Developed by a team of "the ant", headed by **Dr Sunil Kaul**, a member of the Task Force on Roll Back Malaria Guidelines, WHO-SEARO 1999-2000.

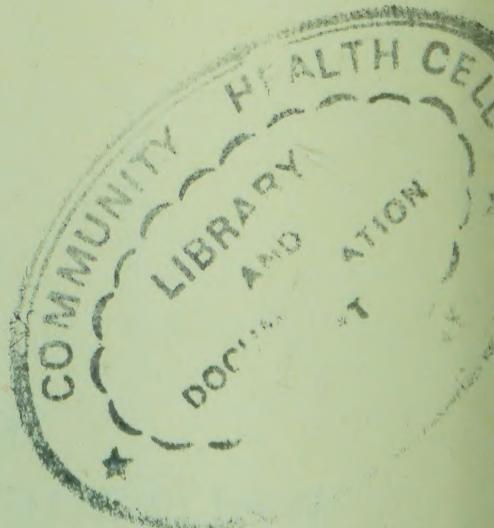
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We are also thankful to Krishan Kalsi and his team at Stet for their help in making the printing of this booklet possible.

Anyone interested in translating this booklet may contact "the ant". We can also provide names of people who have expertise on malaria control in your region.



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# **Foreword**

Despite many big claims made by all parties, malaria remains a deadly scourge in India, taking the lives of many. Those in remote areas are not only left out of any health care but they do not even count in the death figures of our country's health systems.

This booklet is a tribute to all those enthusiasts who continue to try to contain malaria and malaria deaths in whatever capacity they can. The questions addressed in this booklet have their roots in many interactions of the team with people suffering from malaria, and with doctors, nurses, health workers, NGOs and others dealing with them, especially in Northeast India.

Some of the latest knowledge about malaria needed for community control has been included, to prevent healers and patients from falling prey to wrong prescriptions. Latest treatment schedules recommended by the World Health Organization (WHO) and the National Anti-Malaria Programme (NAMP) have been included, though occasionally modified.

We hope this booklet will empower common people with enough knowledge to take forward the issue of malaria.

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# *Did you know this about malaria?*

- A hundred years ago, people believed that bad air caused malaria. Later, drinking of water with mosquito eggs was blamed. Many people still think so, even 100 years after it has been tested and proved that mosquitoes spread malaria!*
- Malaria is supposed to have killed more British soldiers in the Burma Campaign during World War II than enemy bullets!*
- New research tells us that before monkeys had branched into ape and man during evolution, the malaria parasite was already around.*
- There is a place called Quinine in Meghalaya supposedly named after the huge quinine plantations cultivated for curing the malaria of British soldiers.*
- Male mosquitoes drink plant nectar only and do not bite. The female bites only to get protein from our blood to lay 100 to 250 eggs every two to three days!*
- Swarms of mosquitoes on top of our heads or on poles and trees are groups of male mosquitoes doing their sexual dance to attract female mosquitoes!*
- Male mosquitoes die within two to three days; female mosquitoes may live upto a month but most die within 10 to 15 days!*
- Even birds and lizards have malaria parasites, but their parasites are different and cannot cause malaria in us.*
- The main Anopheles responsible for malaria in most parts of India – except those in the northeast – is already resistant to DDT and other chemicals.*

- From only ten baby parasites that enter through a mosquito bite, they grow into 4 lakhs before they break out of the liver into your blood to give you fever. If no medicine is taken to kill them at that time, they grow into 12 million parasites within 2 days, and into 36 crores by the fourth day!
- Only one in eighty Anopheles mosquitoes are found to carry malaria parasites in their bellies when cut open. Imagine what would happen if all of them bore malaria parasites!
- The latest mosquito nets available have chemical insecticides woven into them. You do not need to treat them every 6 months. They are effective for over twenty washes and cost marginally more than plain bed nets.
- Although a vaccine against malaria would be a boon, it may not materialize for another decade!
- There is growing evidence that the new economic policies – which make the poor still poorer and unable to get cheap health care – are responsible for increasing the number of malaria outbreaks in recent years.

## a. What is malaria?

Malaria is an illness caused by a parasite called *Plasmodium*. It enters our blood due to a mosquito bite and causes severe shivering and chills followed by high fever. In many parts of India people easily recognise malaria when they get fever every other day.



Malaria is an age-old illness and it was believed that "bad air" (*malaria*) caused it. Over a hundred years ago an Indian Army doctor proved that mosquitoes cause malaria. Malaria was once found all over the world, but it is now confined to the poor countries of Africa and Asia. For some years after Independence, India exercised control over malaria, but lately the cases are legion, resulting in innumerable deaths.

## b. How do I know that my fever is malaria?

If you have fever, it could be malaria. One sure sign is intense shivering before the onset of fever. The fever usually rises very high after about half an hour of shivering, and comes down after a few hours. There is considerable sweating and the fever *disappears completely by itself*. If no treatment is given, the fever keeps coming every day or two. Because of the fever and sweating, you may feel weak and dry. Many people have headaches and may even vomit.

The fever usually rises every alternate day, but in the first few days of malaria, particularly in children, this pattern may not be apparent. In some cases, malaria affects the brain, kidneys, liver and other important organs which can be dangerous. Hence, any fever along with signs of any of these organs being affected, must warn of dangerous malaria. (See question "j" on page 13 for more on this).

The simplest way to determine malaria is to get your blood tested. Such a test is done using a simple microscope normally available



## IS TEST THE BEST?

*In villages where such tests are not available or you cannot get the results in a day's time, or if you feel that the person testing it is not trained well, then it is better to just start malaria treatment without the test. This is important because some kinds of malaria are dangerous and the person can die in a short time.*

at the nearest government Primary Health Centre (PHC), free of charge. At many places, local village women and men have been trained to conduct tests. There are other ways of testing blood for malaria, but these are costly and not as reliable as the microscope test.

### c. *Can I have malaria even if I have no fever?*

Yes, but it is not common to have malaria with no fever. Some people with very different symptoms, like cramps in legs, cold, cough, slight headache etc. may also turn out to have malaria when their blood is tested. Therefore, in areas known for malaria we should be more careful and extra cautious when anyone falls sick.



### d. *Why do we get malaria only in some seasons?*

To breed well, mosquitoes need a warm and wet (humid) environment. Therefore, during rainy seasons, when there is water for them to breed and also a warm and humid climate, they are found in large numbers, enough to spread malaria to more people. In places with mild winters which receive plenty of rainfall (like in the **northeast region**), people suffer from malaria throughout the year. However, in hilly areas above five thousand feet, malaria is rare, as temperatures are low for the mosquitoes to breed.

## e. How do I get malaria? Can I get malaria immediately after being bitten by a mosquito?



If mosquitoes bite you after biting someone previously infected, the parasites may enter your blood; only 7-14 days later could you get malaria.

When a mosquito bites a patient who has malaria parasites in her/his blood, the parasite enters the mosquito's stomach. Here the parasite needs to multiply for at least 7-14 days before it can grow into large enough numbers to be able to cause malaria illness. (See pages 16-17 for details).

In other words, if a mosquito was to bite you when you had malaria, it would take at least one week before the same mosquito could pass on the parasite to someone else AND another week before such a person would develop fever.

You can also get malaria from a blood transfusion taken for some operation or emergency from a person who had malaria, but this is rare.

## f. What must I do when I get malaria?

**Replace fluids in body:** As sweating and fever cause considerable loss of fluid, drink plenty of watery substances like soups, milk, lime juice, etc. Water with some salt and sugar is also excellent.

**Keep fever down:** If the fever is very high, it may be a good idea to bring the fever down by applying some cloth dipped in cool water to the forehead and body again and again. Paracetamol ('Para-see-tah-mol' sold in the market as such or under brand names CROCIN, CALPOL, FEBREX, PYRIGESIC, etc.) of 500 mg

Under 1 year	1 to 4 years	5 to 8 years	9 to 14 years	Above 14 years
1/4th pill	Half a pill	Half to 1 pill	1 pill	1 or 2 pills

strength may also be taken to bring down the temperature. (For dosages as per the age-group, see the previous page).



**Take malaria medicines:** If you have fever of any type, you may have malaria. Before starting any treatment, try to confirm that it is malaria by asking for a blood test using a microscope. After a test has been sent, start the malaria treatment according to the age as given in question "o" on page 18, even if the result is not available yet. If it is not confirmed, the first day's treatment is considered enough. However, if you are sure that it is malaria **DO REMEMBER TO COMPLETE THE COURSE** even if the fever has gone after the first day's dose.

### *g. Could I have malaria even if my blood test does not show malaria?*

The answer is YES. Well-trained microscopists should be able to find malaria in the blood test, but because of poor training or bad equipment they cannot judge correctly. In addition, if you have already started some malaria medicines, then the test may be negative for malaria even though there are malaria parasites in the blood.

Therefore, although you should try to get a test done before starting medicines, many malaria experts suggest that *if you live in an area known for malaria you must take the entire course of malaria medicines if you have fever but none of the following:*

- No cough
- No cold
- No skin rash
- No boils/abscess/wound
- No flow/discharge from the ear
- No pain and swelling of joints, and
- No burning sensation / pain while passing urine

#### **Take Note**

*The spleen gets enlarged to catch all the red blood cells damaged by malaria parasites and to store iron for future use. Malaria does not cause iron deficiency and there is no need to give iron pills routinely for every malaria*

## *h. Are there other illnesses that can be confused with malaria?*

Yes, there are quite a few illnesses that can be confused with malaria. Any fever could be malaria, but the presence of cough, cold, boils, skin rash, ear discharge, joint swelling, etc. will indicate an illness other than malaria.



*Infections of the urinary tract* also cause fever with shivering. People with such infections usually have a burning sensation or pain while passing urine. A urine test may also confirm this.

High fevers may be present in *typhoid* and in *viral fevers* also, confusing it with malaria. Some people with malaria also test positive when they take a typhoid blood test and then it is difficult to make out whether it is malaria or typhoid. However, in viral and typhoid fevers, the temperature does not go down without medicine, unlike in malaria where the fever vanishes for some time even without medicine.

Even more important, viral fever cures itself within seven to ten days without treatment and is usually not dangerous. Typhoid on the other hand can prove dangerous but takes two weeks to reach such a stage. Therefore, it is most important to treat fully for malaria even before starting treatment for typhoid because dangerous malaria without treatment may kill very early.

## *i. Is malaria dangerous?*

Commonly, there are two types of malaria parasites in India - *Plasmodium falciparum* (PF) and *Plasmodium vivax* (PV). Both these types cause similar features of fever with shivering. However, while PV is not dangerous, PF can cause blockage of blood supply to important organs like brain, kidney, liver, lungs, etc. and is hence, dangerous.

Earlier, PV caused most of the malaria in India but in recent years PF has become the main cause of malaria in many areas. In the northeastern states and Orissa and Madhya Pradesh and in some other parts of India, it is also found that common malaria drugs cannot kill the PF parasite (it is resistant). This, and poor treatment facilities are causing many unnecessary deaths from malaria.

### j. How do I know when malaria is dangerous?

The presence of PF alone may not mean dangerous malaria. Usually, it can be treated easily if full doses of common malaria medicines are taken. However, the presence of the following features (along with fever) will need special attention and treatment:

1. One or more of these: Loss of consciousness, talking irrelevantly, eyeballs looking in different directions; fits – these indicate cerebral (brain) malaria
2. Severe anaemia (lack of blood)
3. Jaundice
4. Very high fever
5. Difficulty in breathing
6. Blood in urine

*These are signs of some important organs being damaged by PF malaria and if not treated quickly and properly, such malaria could lead to death.*

### IS JAUNDICE WITH MALARIA COMMON?

*In malaria where there is heavy breakdown of blood cells, jaundice (which simply means that the eyes and skin turn yellow) may appear even without the liver being affected by malaria. Jaundice due to malaria should not be confused with the jaundice due to liver disease; the latter will disappear with malaria treatment. However, jaundice in malaria tells of huge numbers of parasites in the blood and this may be dangerous. One need to rush such a person for treatment.*

## *k. What should I do if I suspect dangerous malaria? Is its treatment different from treatment for simple malaria?*

Unlike simple malaria, which is non-dangerous and can be easily treated by common malaria medicines like Chloroquine & S-P combinations, dangerous malaria needs better facilities for treatment as organs get affected. Hence, *one should rush the patient to a health centre.*

As mentioned earlier, some of the PF malaria has stopped responding to common medicines. When signs of danger are seen, it is better to start treatment with other malaria medicines, like Quinine (Kwi-neen) and Artemisinin (Ahr-ti-mi-si-nin), which are more expensive but are known to work for sure. Taking the person to a health centre that has trained people to handle such medicines should be your priority.

[The doses recommended for Quinine and Artemisinin (only to be given for dangerous / resistant malaria) by WHO and NAMP are given in the Appendix. You may check if you have been given the appropriate doses by your treating doctor].

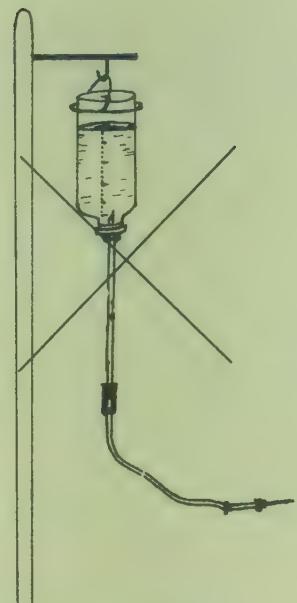
## *l. Are injections and drips (many call it saline) needed to treat malaria?*

NO. In more than 95% of patients, there is NO requirement of any injection or drip (many people call it 'saline') whatsoever. *Injections are required in those forms of dangerous malaria where the person is unconscious or just cannot take medicine by mouth.* Even in such cases, the moment the person is able, he/ she must start taking medicines by mouth.



Only when the injection Quinine is being given to patients who are unconscious, a drip of glucose is required. A drip of **saline** (dissolved salt water) is dangerous and **must not** be given in

malaria. If at all required, make sure that Quinine is given at least **3 times** a day (twice a day for children) and **not any less**.



### *m. Where can I get treatment for malaria?*

The government health services usually train one person in the village in handling malaria medicines and in taking blood slides. Called Drug Distribution Centres or DDCs and Fever Treatment Depots or FTDs, these places should be able to give you medicines free of cost. You may get these medicines even with your Anganwadi worker/ teacher.

For malaria with signs of danger, the doctor needs to start with Quinine tablets (injections only in case the person cannot swallow). If no improvement follows, Artemisinin may have to be given but both need expertise. It is important to start them urgently, but it would be better to take the patient to a person who is trained to handle these medicines. You can check if the doctor has given the correct medicines in the correct doses by comparing the treatment with the WHO and NAMP recommended treatment given on page 32.

### *n. Is it safe to take malaria medicines even if I am not sure I have malaria fever?*

YES, it is safe to take malaria medicine even if you and your doctor are not sure that you have malaria. But if you do not improve even after taking full doses of malaria medicines, then you should suspect another disease.

*It is safer to give malaria medicine even if not sure, instead of relying on a blood test result that turns out negative because of poor training of person checking the slide or poor quality equipment.*

at least 6 male and 6 female seed parasites needed for parasites to multiply inside mosquito

each man  
into lakh  
inside

female anopheles feeds  
on blood of malaria  
patient having seed  
parasites



# LIFE OF M. PAI

male seed  
parasite

female seed  
parasite

**PRIMAQUINE**  
*kills seed  
parasites in  
blood to prevent  
malaria from  
spreading*

only some parasites become capable of spreading malaria

every 48 hours each parasite multiplies into 20-30 new parasites

**CHLOROQUINE**  
parasites only  
the blood

red cells break letting out  
new parasites; patient  
shivers and has fever

# LE RIA TE

each parasite enters  
a red blood cell

NE kills  
inside



lakhs of baby parasites fill the mosquito's mouth

the mosquito bites another person and injects a few baby parasites into the person

**PRIMAQUINE**  
works here to  
prevent malaria  
happening again  
and again

these baby  
parasites hide in  
the liver for 7–14  
days and grow  
there

in 7-14 days each new  
parasite multiplies into  
20 to 30 thousand;  
they break the liver cells  
and get into the blood;  
patient shivers and  
has fever

## *o. What is the correct medicine for malaria?*

Everyone should know the correct treatment of malaria. It is so common an illness that its treatment should also be known to lots of people. Check that your doctor is giving you the right medicines in correct doses.

**Chloroquine** (Klo-ro-kwin) and **S-P combination** tablets are meant for *malaria that is not dangerous* (dosage given below) and usually gives no more problems than a burning sensation in the stomach or vomiting if taken without food. *Take the malaria medicines with some food and water to avoid these problems.* The World Health Organization (WHO) considers them safe even for pregnant women and those breastfeeding their child *although it is better to avoid them in the first three months of pregnancy.* When taken in much higher doses than allowed for the age, or taken again and again within a short time, these medicines may cause difficulty in seeing and hearing in the patient, for some time.

WHERE MALARIA CAN BE TREATED WITH CHLOROQUINE			
Age of person	No. of tablets of Chloroquine 150 mg base Take ALL tablets TOGETHER at one time		
	1st day	2nd day	3rd day
Less than 1 year	Half a tablet	Half a tablet	Quarter tablet
1 to 4 years	1	1	Half
5 to 8 years	2	2	1
9 to 14 years	3	3	1 and a half
Above 14 years	4	4	2

Take Chloroquine tablets with water; you should have taken some food prior to this.



Chloroquine is also sold under the following brand names:  
**LARIAGO**  
**NIVAQUINE**  
**MALAQUIN**  
**RESOCHIN**

## *p. Why don't I get better even after taking Chloroquine tablets for malaria?*

Chloroquine has become less powerful in killing the PF malaria parasites because people do not take the full dose, very often due to the doctors' ignorance. S-P combination in the doses given below is the next medicine for PF malaria when Chloroquine does not work.

*If Chloroquine has been taken for two days without any relief, and we are reasonably sure that the fever could be malaria (but no signs of danger are present), then S-P combination medicine may be given.*

Age of person	No. of tablets of S-P combination (S 500 + P 25)* To be taken together but ONCE ONLY	
Above 14 years	Below 40 kgs: 2 tablets	Above 40 kgs: 3 tablets
9 to 14 years	1 and half tablets	
5 to 8 years	1 tablet	
1 to 4 years	Half a tablet	
Less than 1 year	Give Quinine instead of S-P	

\* S 25 mg/kg bodywt + P 0.25 mg/kg bodywt ONCE only (NAMP)

*(Sulpha-Pyrimethamine combinations are also sold under brand names MALOCIDE, METAKELFIN, PYKALFIN, REZIZ, etc.)*

*Both Chloroquine and S-P combinations may take two to three days to kill the malaria parasites in the blood and bring body temperature to normal. Give the medicine some time to work instead of changing or stopping the treatment.*

### **Caution:**

In PV malaria, some parasites may survive in the liver despite treatment and cause malaria again. Primaquine would be needed to get rid of parasites fully. (See question "s" on radical treatment of malaria).

## *q. Why is it important to take the full course of malaria medicines and in correct doses?*

With the first day's dose of medicine, most of the malaria parasites will die, but the strongest of them will need at least two more days of treatment. These strong parasites if not eliminated entirely, will breed more and stronger parasites. The patient is likely to get malaria again and this time it will not be easy to treat because s/he has more strong parasites.

In addition, the malaria parasite that will be picked up by mosquitoes to spread to others will also be made up of strong malaria parasites. Hence, unless all of us complete the course of malaria medicines, it is likely that more and more of us will get malaria due to even stronger parasites that need even more costly medicines to treat.

*Paracetamol when given along with Chloroquine, tends to delay the elimination of parasites in the blood. Give Paracetamol only if fever is very high !*

## *r. Is there any herbal treatment for malaria?*

Quinine comes from the bark of the Cinchona tree. Artemisinin comes from the plant Artemisia or sweet wormwood. We learnt about the anti-malaria qualities of these from people who had been using them against malaria fevers for thousands of years. We can still use these plants if we have them around us.



One of the herb-based medicines – *Ayush 64* – was developed by India and introduced in the health system against PV malaria. Other Indian herbs like *Chiraita* and *Aak* (*Calotropis gigantea*) have also been known to be good against malaria. However, none of them can be recommended for use by government health systems. None of

them has been tested by standards of modern medicine yet, and has not been proved as effective as presently available medicines.

## s. What is implied by radical treatment for malaria?

The use of the medicine Primaquine for removing malaria parasite totally from the human body is called *radical treatment*.

Immediately after entry into the blood, malaria parasites hide inside the liver for a week or two. After this, while all PF parasites enter the blood stream, most PV parasites do not. Some of them keep hiding in the liver and may cause recurrent malaria.

Medicines like Chloroquine cannot kill the malaria parasite when hiding in the liver or when the parasites are in the seed form (for details, see pages 16–17). For this another drug called Primaquine needs to be given. This proves useful in patients with PV to stop them from getting malaria again and again.

### DOSE OF PRIMAQUINE FOR RADICAL TREATMENT

Age of patient		Less than 1 year child and pregnant woman*	1 to 4 years	5 to 8 years	9 to 14 years	Above 15 years
PV malaria	Primaquine (2.5 mg tab) daily for 5 days	NOT SAFE – not to be given	1 (2.5 mg)	2 (5 mg)	4 (10 mg)	6 tablets (15 mg)
PF malaria	Primaquine (7.5 mg tab) once only	NOT SAFE – not to be given	1 (7.5 mg)	2 (15 mg)	4 (30 mg)	6 45 mg

\* Before giving her Primaquine, ask every woman between 15 and 45 years if she has missed her period for she could be pregnant.

Nowadays, many experts say that while radical treatment is ideal to get rid of malaria in a person, it is not necessary in areas which show the persistent presence of both mosquito and malaria. In their view, even if we were to completely remove malaria infection from one patient at a time, s/he cannot be saved from another mosquito bite and another infection. Hence they feel that there is no need to give people Primaquine – which is not a safe medicine – in areas known for malaria.

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## *t. Can I take any medicines to avoid getting malaria?*

Yes, Chloroquine and S-P combination medicines can be taken once a week to prevent malaria. The dose is as given below:

Age groups	Below one year	1 to 4 years	5 to 8 years	9 to 14 years	Above 14 years
Chloroquine (Once a week)	Quarter (1/4th) of a tablet	Half a tablet	1 tablet	1 and half tablets	2 tablets
S-P combination (Once a week)	—	Half a tablet	1 tablet	2 tablets	Below 40 kg 2
					Above 40 kg 3

**Caution:** However, these medicines when taken for a long period also prevent any immunity — the power of our body that can fight disease — from developing. If we forget to take our weekly dose while living in an area known for malaria, we are likely to get much more severe malaria as our immunity would be lost. Those of us who live in areas where malaria is rampant will have to take malaria medicines throughout our lives to avoid getting malaria. This could lead to problems in seeing and hearing.

Hence, our National Anti Malaria Programme (NAMP) and WHO advise malaria medicines to avoid malaria only for:

- visitors coming for a few weeks or months from an area with no malaria to a known malaria area. Such people must take the once-a-week dose as per the above table, but a *double dose* must be taken a week before and a week after the trip (NAMP).
- all pregnant women from their fourth month of pregnancy MUST get the

### **RADICAL TREATMENT IN MALARIA OUTBREAKS**

*In malaria outbreaks and epidemics caused by PF, Falciparum Radical Treatment (called FRT) is given. In such situations, we presume every fever to be PF malaria and to be dangerous. Even without a blood test, the first day's dose of malaria medicine is given along with the correct dose of Primaquine for PF. Chloroquine or S-P combination is meant to reduce the chances of death in patients and Primaquine cuts down the chances of spreading the outbreak of malaria.*

once a week dose to prevent malaria because malaria fever can cause risk to them and their baby.

Herbs like *Chiraita*, *neem* and *tulasi* and many others in malaria prone areas have been taken daily every morning in the rainy seasons for their quality of 'saving the people from fevers'. The good effect of these herbs is time-tested, and even if not fully effective, can be safely recommended.

## *u. What is so special about malaria in women and in children? Are medicines safe in pregnant women?*



Studies show that mosquitoes are especially attracted to pregnant women. Pregnant women are more prone to malaria as they have lower immunity and strength (seventy per cent of Indian women anyway have been found to have anaemia). The severe shivering of malaria can also cause the womb (uterus, where the baby grows for nine months) to be squeezed and this may cause abortion or death of the child inside.

Chloroquine and S-P combinations are considered absolutely safe in pregnant women. Quinine has a slight risk of causing abortion or premature delivery, but the risk is far less than a bout of malaria with its shivering. Hence, it is recommended that even pregnant and breastfeeding women be given Quinine when required.

We also see that more than half of all Indian children weigh less than normal. They are likely to get malaria more often and stand a greater chance of contracting dangerous malaria. Hence, in areas known to have malaria, quicker action needs to be taken when children get fever.

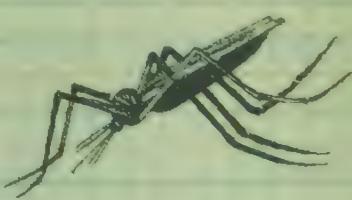
*High iron levels improve the capacity of malaria parasites to remain in the body. Do not give iron as a routine to malaria patients.*

## v. Do I need to change my normal food habits when I have malaria?

No, not necessarily. Also, you need not avoid any type of food that you were taking earlier if you have malaria. However, you **must take more liquids**. Since you may not feel like eating much when you have malaria, it is good to take more of such food that gives you energy, like sugar, potatoes, rice/roti, fruits, fried food, eggs, etc. Besides, food rich in proteins like daal, fish, eggs and meat would help in repairing the blood damaged by malaria.

## w. Do all mosquitoes spread malaria and where do malaria mosquitoes come from?

Not all mosquitoes spread malaria. Only the Anopheles variety (you can know as they sit with their tail in the air) can spread malaria. The male mosquitoes do not bite humans because it is only the female mosquito that needs protein every two days to lay eggs, and she gets this from the blood of humans or animals by biting them. When a female mosquito bites someone having malaria parasites in his blood, she picks up some parasites along with the blood. After a week or two, the parasites breed inside the mosquito's stomach and these are transferred to other human being through the female mosquito's saliva when she bites again.



### HOW MOSQUITOES BREED?

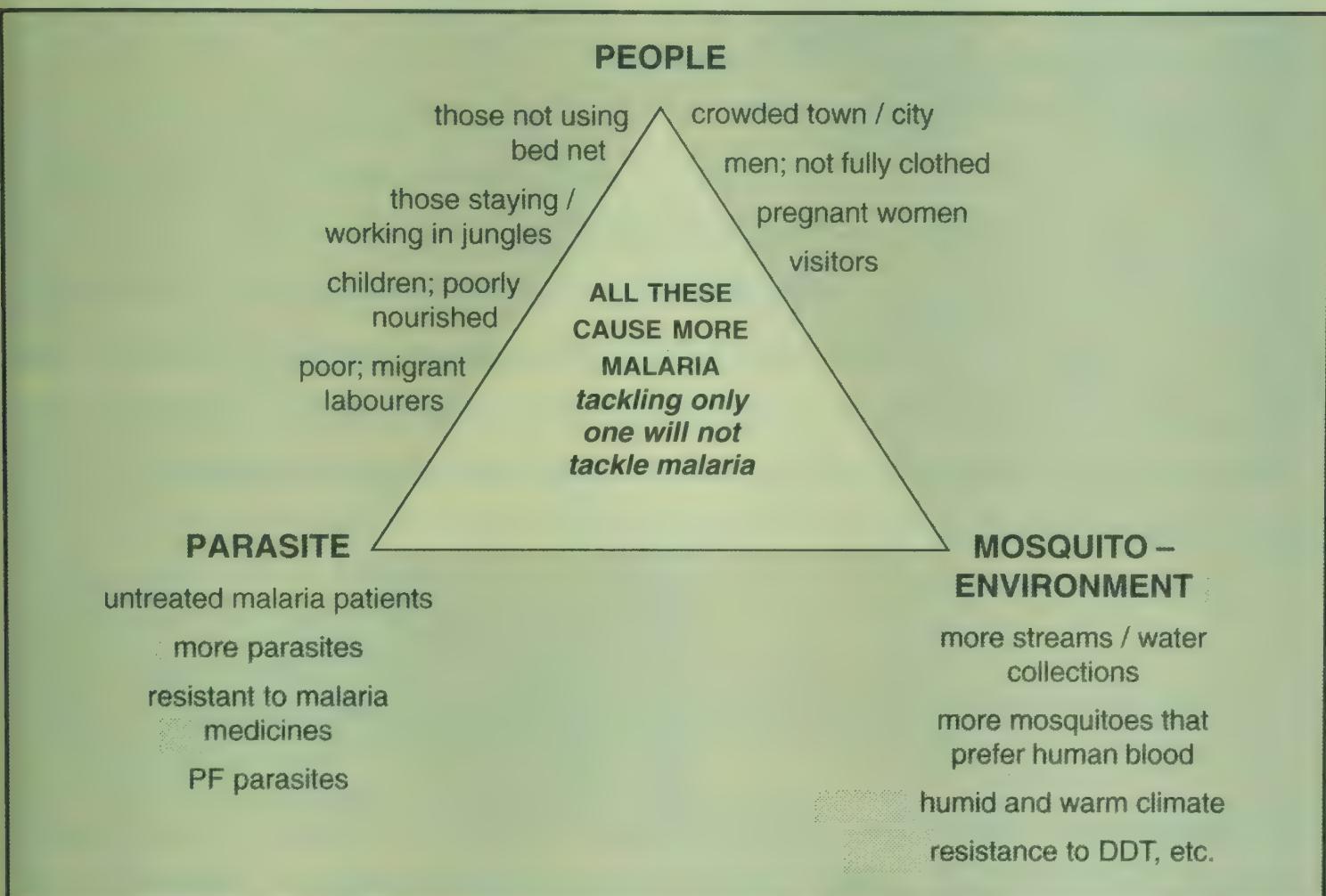
**Although there are 58 types of Anopheles in India, only six of them are responsible for most of the malaria spread in India.** Most of the female Anopheles lay eggs on stationary, clean water but a few of them also lay eggs on slow flowing water in streams with grassy margins and are important for the malaria in the northeast. (Mosquitoes breeding in dirty water, in drains and water-filled garbage, do not spread malaria).

If the water is not greatly disturbed, the eggs turn into small larvae—seen floating in water like fast vibrating rods—and about a week later, they come out of the water as adult mosquitoes and fly away.

## x. How does malaria spread in my area?

Malaria needs three things to spread:

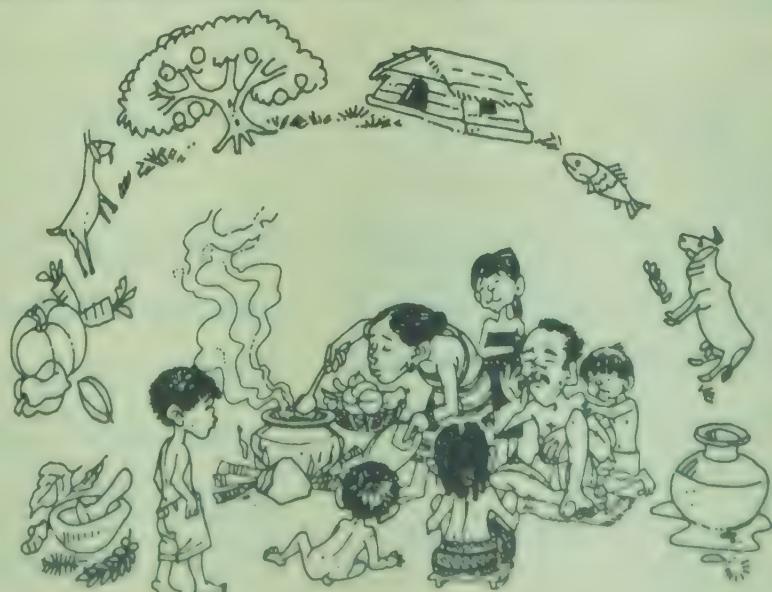
1. Mosquitoes
2. People, and
3. Parasites (that is, patients with parasites)



The larger the number of mosquitoes there are in a place, the higher the chances that they will bite you.

The higher the number of people living in a place, the higher the chance that mosquitoes will bite them and not bite animals.

The higher the number of people who do not get treatment for malaria, the better the chances that mosquito will pick parasites from their blood to pass them on to other people.



## y. Who is responsible for controlling malaria?



Although there is a malaria department in the government, one should NOT expect **ONLY** them to eliminate malaria. Malaria is everybody's responsibility.

Even we will have to share the blame. We tend to understand

the problem of malaria only when we fall ill. At that time we have to pay hundreds of rupees, but often we do not spend money on buying mosquito nets that would reduce the chances of getting bitten in the night. As communities we can take some action in and around our villages to systematically reduce the number of places where mosquitoes breed, but often we do not.

## z. How do we protect ourselves from malaria?

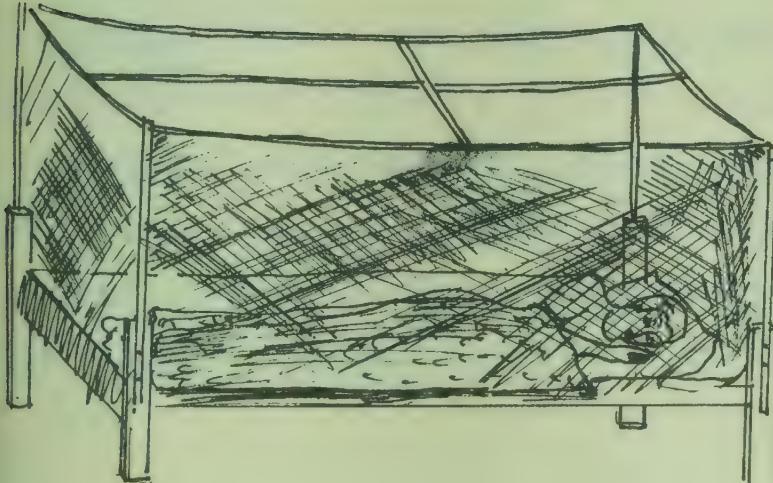
**Use mosquito nets:** One of the easiest solutions thus is to be under a mosquito net during the biting hours of mosquitoes. Hanging an insecticide treated bed net can keep mosquitoes away from the entire room.

**Cover your body well after dark:** Wearing long-sleeved garments and keeping the legs and body covered, gives lesser chance for the mosquitoes to bite. This may be one of the reasons that fewer women than men contract malaria – unless they are pregnant.



**Keeping mosquitoes away:** One may smoke the rooms in the evening hours with *dhoona* or with *neem* leaves as has been the custom in many households in India. This keeps the mosquitoes away at the time when they tend to get inside the

houses. In villages, one or two drops of *neem* oil obtained from the seeds is added to the kerosene in night lamps: another effective way to keep mosquitoes away. Applying *neem* oil and Citronella oil on the skin also keeps away mosquitoes. A number of creams and oils having herbs and chemicals can be found in the market. Besides, we also get coils and mats with chemicals that if lit or heated the whole night can allow a good sleep, but they have been seen to cause skin reactions (allergy) and breathing problems in many.



### *aa. Are mosquito nets enough to prevent malaria?*

As mosquitoes may not bite only at times when we sleep, mosquito nets may not guarantee full protection. Also, it is seen that some of the *Anopheles* varieties especially those in the northeast tend to bite outside the house - even though they may rest inside the house for some time during the day. Hence, mosquitoes will still bite those working at night, or those going into forests early morning to collect wood.



### **WHEN DO MOSQUITOES LIKE TO BITE?**

*Most mosquitoes bite during the night hours only. Culex — the mosquitoes that spread *Filaria* and Japanese Encephalitis (also called brain fever by some) breed mainly in the drains and stinking dirty water, and bite at night. They bite painfully, have a disturbing sound and spoil our sleep.*

*Another type of mosquito, Aedes, bites during the daytime and is big and dark with bands of black and white on its legs.*

*The bite of Anopheles, usually goes unnoticed because it is light coloured, makes little sound and its bite is relatively painless. All the varieties of Anopheles bite between 8 p.m. in the evening to around 6 a.m. in the morning and we need to protect ourselves during that period.*

## *bb. Are chemically treated mosquito nets better than normal nets for avoiding malaria?*

Chemically (insecticide) treated bed nets have reduced malaria greatly in many places. The chemical not only kills mosquitoes on contact, it also keeps them away. Hence, even if there is a hole in the net or the net is not tucked under the bed properly, the mosquitoes cannot come near enough to bite.

## *cc. How do I and my community control mosquito population to check malaria?*



Mosquitoes can fly to a distance of a kilometre or so. There is no point in protecting **only** our family or our village. Every village will have to become aware and take action together. To control the mosquito population, the cycle of people, parasite and mosquito (as shown on page 25) will have to be

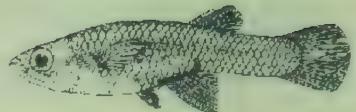
broken.

**One or more of the following may be done:**

1. Avoid any collection of water that may go untouched for 7-10 days. For example, check if you have cans, tyres, open tanks, or coconut shells where water may collect long enough for the mosquitoes to breed. Cover every water tank, pool or well.
2. Anopheles mosquitoes grow in small puddles made by hooves of cattle around ponds and *kutchha* village roads. These should be filled up. Cut bamboo may also allow breeding of malaria mosquitoes; try cutting the bamboo at the joint (node) or cover the cut end with mud.
3. Water in the rice fields is a good place for the breeding of



mosquitoes. Seed the water with small fishes like Guppy, Tilapia, etc. which feed on mosquito larvae.

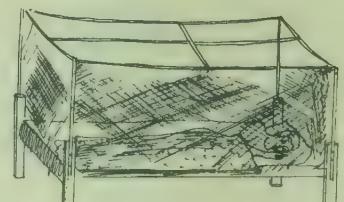


4. For disused wells, ponds, drains etc., take a broom, dip it in used oil/kerosene and sprinkle every week or two on the surface of the water collection as far as arm's length. The oil layer will not allow the mosquito larvae to breathe and grow. Some fish can be introduced in these as well if the water is clear enough.



5. Allow government DDT (insecticide) spray people, rather insist on them, to spray inside your rooms and kitchens. Do not allow them to spray the cattle shed as mosquitoes are attracted to the cows and buffaloes for their feed and not human beings.

6. Try to use mosquito nets treated with insecticides – these not only keep away mosquitoes but also kill those that come in contact with it.



#### *dd. What services should I expect from the government health department for malaria?*



Though controlling malaria is your and my responsibility too, it does not mean that we must excuse the government health system and the malaria department of their responsibility. They are paid to carry out certain duties which we must be aware of and demand for. These duties are:

1. For every 5000 population, there should be one **male health worker** – other than the **female ANM (nurse)** – who is supposed to go *around* every village *at least once a month* and

take blood slides of anyone having fever since his past round, besides giving adequate treatment.

2. For every four male health workers, one **health assistant (male)** is supposed to go around and check *at least 10% of all houses in each village* for malaria each month.
3. At least one **Drug Distribution Centre / Fever Treatment Depot** should exist for every village of thousand population. Basic fever and malaria medicine should be kept there and a person trained on how to give it.
4. At least **two rounds of DDT / Insecticide spray** in every house in areas known for malaria.
5. People of the area should be informed about:
  - where the mosquito in a particular area is breeding so that people can try to do something about it;
  - whether the mosquito in your area prefer to bite outside or inside, so that you know if buying a net is a sensible idea or not;
  - where to get fishes that eat mosquito larvae;
  - where to get the chemical to treat the bed net and how to use it;
  - when the DDT/insecticide team will come (two days' notice is required) to the house so that you can plan to get the house sprayed properly; and

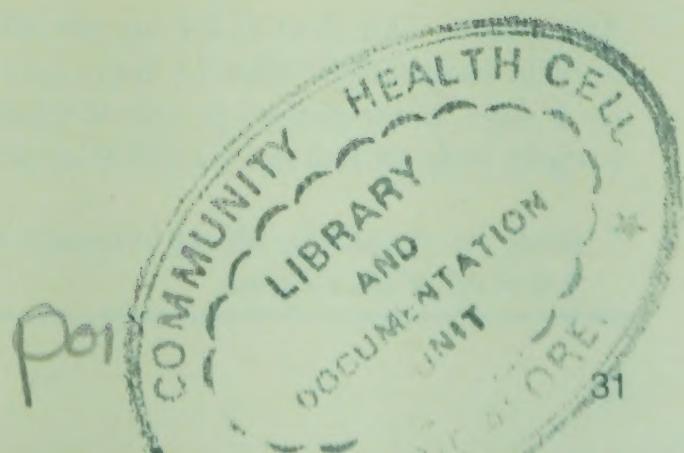


- whether Chloroquine works on the malaria parasite in your area or should your doctor give you the S-P combination as the first drug.

6. Availability of one **resident** female and one male health worker every 5000 population (3000 for tribal areas), one primary health centre every 30,000 population (20,000 for tribal areas) and a thirty bed hospital with specialists for emergencies in every development block or 1 lakh population.

*Malaria can be and should be  
fought together. And it is up to each one of us  
to decide that we will neither die, nor let  
another die from malaria.*

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# Appendix: Doses for managing severe malaria

(all doses in accordance with Management of Severe Malaria: A Practical Handbook, WHO 2000)

## 1. DOSES OF QUININE:

a. In simple, non-dangerous malaria where Chloroquine and S-P combination does not decrease malaria fever and blood levels of parasites in two days (48 hours):

Quinine to be given by mouth in tablet form:

Quinine at the rate of 10 mg for each kilo of body weight to be given three times a day for seven days continuously. E.g., a child of 10 kilo body weight will need 100 mg of tablets or syrup three times a day. As smallest tablets are of 300 mg each, half a tablet three times a day can be given even though it would mean approximately 150 mg at a time (you could break off some portion of this half piece to be more accurate).

b. In dangerous forms of malaria where the person cannot swallow by mouth or is unconscious:

To be given by injecting into the vein directly along with a Glucose drip:

**First dose:** Quinine Dihydrochloride 20 mg per kilo body weight\* by mixing with 5% Glucose (also called 5% Dextrose) or some other isotonic fluid 10 ml per kilo body weight slowly to be finished within four hours by giving it I.V. (inside the vein). For e.g., a twenty kilo child will start with 400 mg of Quinine mixed with 100 (or two hundred) ml of 5 % Glucose.

**Later doses:** Starting four hours after the end of the first Quinine drip (that is, eight hours after the start of treatment), 10 mg per kilo of Quinine over four hours mixed in 5 to 10 ml of 5% Glucose should be given. This is to be repeated every eight hours (for children below ten years, repeat only every twelve hours) until the time the patient regains consciousness and can swallow. The rest of the drug then should be given by mouth to complete a treatment of seven days (in doses given in above section).

If Quinine for some reason cannot be given by I.V., give the same doses of Quinine Dihydrochloride in the muscles of the front of the thigh (half injection in one thigh and the rest in the other thigh) – not in the buttock.

\* required only if Quinine has not been given by mouth or by injection in the past 12 hours – otherwise start as per doses given in 'later doses' below.

## 2. ARTEMISININ AND DERIVATIVES:

(to be used in India only for the dangerous form of malaria, NOT for all falciparum patients)

Artemether : 3.2 mg per kilo body weight in the muscle (I.M.) on the first day followed by 1.6 mg per kilo body weight daily for 6 days. If patient is able to swallow, the daily doses can be given by mouth. [NAMP: 1.6 mg per kg two doses at 4-6 hours interval on first day; later 1.6 mg per kg once daily for 5 days].

OR

Artesunate\*: One dose of 2.4 mg per kilo body wt for the first time by vein (I.V.), then 1.2 mg per kilo body weight after 12 hours and after 24 hours; then 1.2 mg per kilo body weight daily for 6 days. If the patient is able to swallow, then daily doses can be given by mouth. [NAMP: 1 mg/kg body wt two doses I.M/I.V on first day; later 1 mg per kg once daily for 5 days].

\* made by dissolving 60 mg ampoule in 0.6 ml of 5% Sodium Bicarbonate and diluted with 3 to 5 ml of 5% Glucose.



*Formed recently, "the ant" is an organization based in Assam working with village communities. It also supports other organizations in the northeast region on various issues through training, building capacity and connecting them to resources and to each other. "the ant" is currently working on developing northeast-specific training and communication material on community health issues.*



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